

Listing of Claims

The following listing of claims will replace all prior versions, and listings, of claims in the subject application:

1. (currently amended) An ultrasonic probe including an insert section which is to be inserted into a body cavity organ of a subject and a handle section which couples with the insert section, wherein a first predetermined number of vibrator elements are disposed in an array at the tip of the insert section around entire 360 degree outer circumference thereof and a connection change over switch is disposed, and the connection change over switch successively changes over electrical connection of a second predetermined number of vibrator elements among the first predetermined number of vibrator elements to be connected with ~~the second a third~~ predetermined number of ultrasonic wave transmission and reception channels, in which each of the second predetermined number and the third predetermined number is smaller than the first predetermined number, and

each of the plurality of vibrator elements in the array is assigned a consecutive ID number, and the connection change over switch connects a first vibrator element having a lowest ID number and a second vibrator element having a highest ID number to respective corresponding ultrasonic wave transmission and reception channels each having a predetermined delay time so as to permit successive scanning of the plurality of vibrator elements, from the first vibrator element having the lowest ID number in an order of increasing ID number through remaining vibrator elements in the array to the second vibrator element having the highest ID number, and then from the second vibrator element having the highest ID number to the first vibrator element having the lowest ID number,

wherein the connection change over switch is constituted in such a manner that each of the ~~second~~ third predetermined number of the ultrasonic wave transmission and reception channels is connectable with the first predetermined number of the vibrator elements at the second predetermined number of channel intervals, [[and]]

the delay times of the ultrasonic wave signals transmitted and received from the ~~second~~ third predetermined number of ultrasonic wave transmission and reception channels are set changeable at respective times, and

the second predetermined number is equal to the third predetermined number, and each of the second predetermined number and the third predetermined number is greater than one, and

wherein the connection change over switch is configured for each of the third predetermined number of ultrasonic wave transmission and reception channels to be connectable to a corresponding subset of plural ones of the vibrator elements, and a number, equal to the second or third predetermined number, of vibrator elements are used to focus ultrasonic wave beams at a time.

2. (currently amended) An ultrasonic diagnostic apparatus including an ultrasonic probe having an insert section which is to be inserted into a body cavity organ of a subject and a handle section which couples with the insert section, wherein a first predetermined number of vibrator elements are disposed in an first array at the tip of the insert section around entire 360 degree outer circumference of the ultrasonic probe, and an ultrasonic diagnostic apparatus main body having a [[first]] third predetermined number of ultrasonic wave transmission and reception channels for transmitting and receiving ultrasonic wave signals to the ultrasonic probe and an ultrasonic wave image computing circuit for computing ultrasonic images based on the ultrasonic

wave transmission and reception signals from the ~~second~~ third predetermined number of ultrasonic wave transmission and reception channels, a connection change over switch is disposed, and the ultrasonic wave image computing circuit in the ultrasonic diagnostic apparatus main body includes an ultrasonic tomogram computing circuit and an ultrasonic blood flow image computing circuit, and the connection change over switch successively changes over electrical connection of [[the]] a second predetermined number of vibrator elements among the first predetermined number of vibrator elements to be connected with the ~~second~~ third predetermined number of ultrasonic wave transmission and reception channels and is ON and OFF controlled so that the delay time of ultrasonic wave signal transmitted and received by a vibrator element located at the center of a second array of the second predetermined number of the vibrator elements being connected at respective times assumes the maximum and the delay times of ultrasonic wave signals transmitted and received are distributed in a symmetric manner with reference to the center, in which each of the second predetermined number and the third predetermined number is smaller than the first predetermined number,

each of the plurality of vibrator elements in the first array is assigned a consecutive ID number, and the connection change over switch connects a first vibrator element having a lowest ID number and a second vibrator element having a highest ID number to respective corresponding ultrasonic wave transmission and reception channels each having a predetermined delay time so as to permit successive scanning of the plurality of vibrator elements, from the first vibrator element having the lowest ID number in an order of increasing ID number through remaining vibrator elements in the first array to the second vibrator element having the highest ID number, and then from the second vibrator element having the highest ID number to the first vibrator element having the lowest ID number,

wherein the connection change over switch is constituted in such a manner that each of the ~~second~~ ~~third~~ predetermined number of the ultrasonic wave transmission and reception channels is connectable with the first predetermined number of the vibrator elements at the second predetermined number of channel intervals, [[and]]

the delay times of the ultrasonic wave signals transmitted and received from the ~~second~~ ~~third~~ predetermined number of ultrasonic wave transmission and reception channels are set changeable at respective times,

the second predetermined number is equal to the third predetermined number, and each of the second predetermined number and the third predetermined number is greater than one, and

wherein the connection change over switch is configured for each of the third predetermined number of ultrasonic wave transmission and reception channels to be connectable to a corresponding subset of plural ones of the vibrator elements, and a number, equal to the second or third predetermined number, of vibrator elements are used to focus ultrasonic wave beams at a time.

Claims 3-5 (canceled).

6. (previously presented) An ultrasonic diagnostic apparatus according to claim 2, wherein the predetermined number of the vibrator elements connected to the predetermined number of the ultrasonic wave transmission and reception channels at respective times by the connection change over switch is that which covers about 90 degrees over the outer circumferential face at the tip of the insert section.

7. (original) An ultrasonic diagnostic apparatus according to claim 2, wherein the ultrasonic wave image computing circuit further includes an image selection circuit.

8. (original) An ultrasonic diagnostic apparatus according to claim 2, wherein the predetermined number of the vibrator elements connected to the predetermined number of the ultrasonic wave transmission and reception channels at respective times by the connection change over switch is variable depending on the depth of a portion of a body cavity organ for image taking.

9. (original) An ultrasonic diagnostic apparatus according to claim 2, wherein the ultrasonic diagnostic apparatus main body further includes an image display unit which displays an ultrasonic tomogram and an ultrasonic blood flow image based on outputs from the ultrasonic tomogram computing circuit and the ultrasonic blood flow image computing circuit.

10. (original) An ultrasonic diagnostic apparatus according to claim 4, wherein the successive change over of the electrical connection by the connection change over switch of the predetermined number of the ultrasonic wave transmission and reception channels with the array of the predetermined number of vibrator elements is performed by repeating an operation of disconnecting the rear most vibrator element among the array of the predetermined number of the vibrator elements in the scanning direction by the ultrasonic wave signals with an ultrasonic wave transmission and reception channel and of newly connecting a vibrator element adjacent to the top vibrator element among the array of the predetermined number of the vibrator elements in the scanning direction by the ultrasonic wave signals with the ultrasonic wave transmission

and reception channel of which connection with the rear most vibrator element was disconnected immediately before.

Claim 11 (canceled).

12. (original) An ultrasonic diagnostic apparatus according to claim 10, wherein the successive change over of the electrical connection by the connection change over switch of the predetermined number of the ultrasonic wave transmission and reception channels with the array of the predetermined number of vibrator elements is performed by shifting the scanning direction by the ultrasonic wave signals over the entire 360 degree circumference.

Claims 13-15 (canceled).

Claim 16 (previously presented): An ultrasonic diagnostic apparatus according to claim 2, wherein the delay times of the ultrasonic wave signals transmitted and received from the first predetermined number of ultrasonic wave transmission and reception channels are shifted from those immediately before by one in accordance with the time changes.